



Nanjing Linko Semiconductor Co. Ltd.

# LKS513 Datasheet

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# 1 Summary

## 1.1 Description

The LKS513 is a three-phase 40V, high speed half-bridge pre-driver for power P/N MOSFET. It has two inputs for high side and low side, and two outputs per channel with internal dead time to avoid cross-conduction.

The input logic level is compatible with 3.3V/5V/15V signal. Output 10V gate voltage for both PMOS and NMOS.

It also built in a 5V/30mA LDO for MCU or other device power supply, and have thermal shut down protection for safety.

## 1.2 Features

- Three-phase outputs for P/N MOS half-bridge
- Operation supply range from 8V to 28V
- Independent inputs for high side and low side
- Output 10V ( $V_{CC} > 10V$ )  $V_{GS}$  for both PMOS and NMOS
- 3.3V, 5V and 15V input logic compatible
- Built-in 5V / 30mA LDO
- Built-in dead time
- Built-in TSD
- Available in ESOP16 package

## 1.3 Typical Application

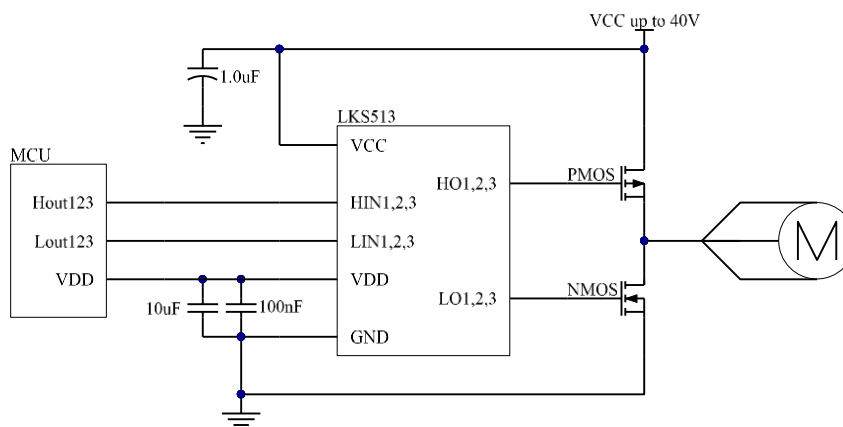


Figure 1-1 Typical Application Circuit

### 1.4 Internal Block Diagram

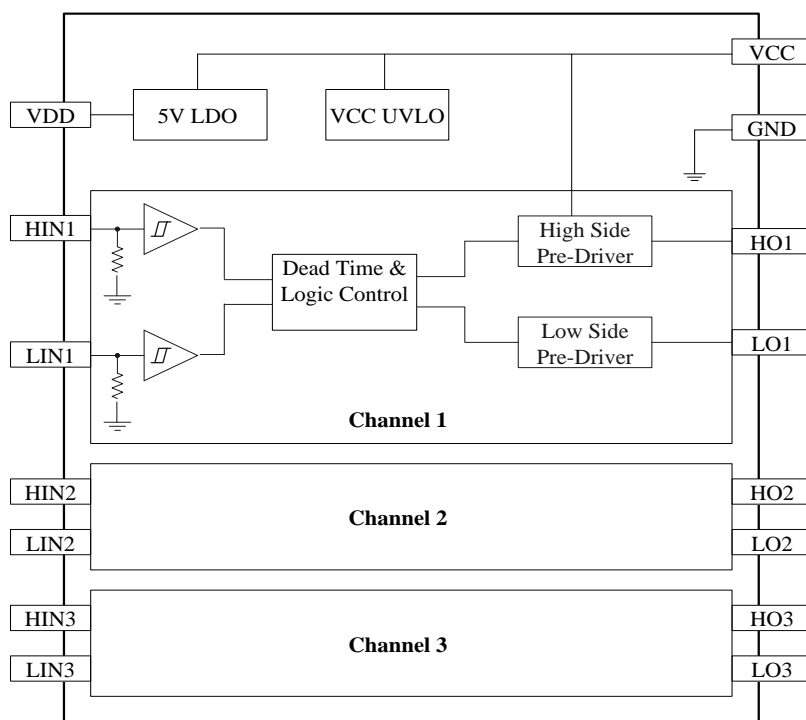


Figure 1-2 Internal Block Diagram

### 1.5 Waveforms

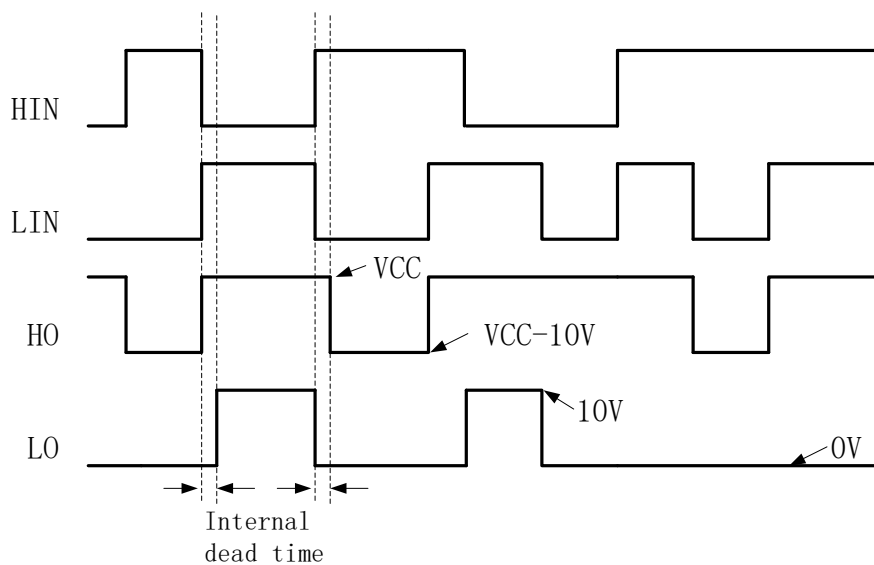


Figure 1-3 Input/output Timing Diagram



## 2 Pin Configuration and Ordering Information

### 2.1 Pin Diagram

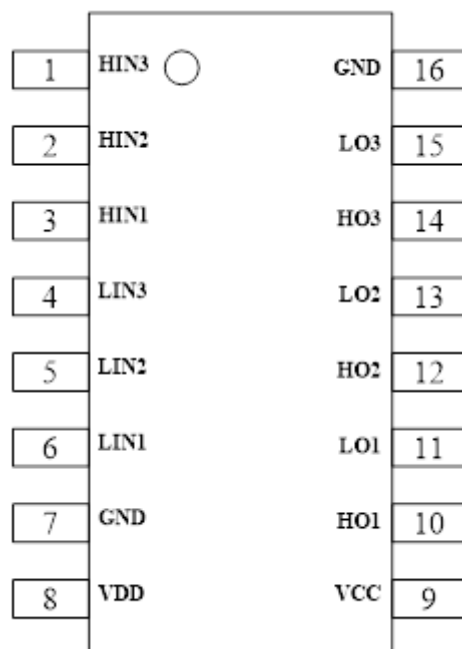


Figure 0-1 Pin Configuration

### 2.2 Pin Definition

Table 0-1 Pin definition

Pin No.	Name	Description
1	HIN3	Logic input for high side channel 3
2	HIN2	Logic input for high side channel 2
3	HIN1	Logic input for high side channel 1
4	LIN3	Logic input for low side channel 3
5	LIN2	Logic input for low side channel 2
6	LIN1	Logic input for low side channel 1
7	GND	Ground, short to pin 16
8	VDD	5V LDO reference output
9	VCC	Power supply voltage
10	HO1	High side driver output channel 1
11	LO1	Low side driver output channel 1

12	HO2	High side driver output channel 2
13	LO2	Low side driver output channel 2
14	HO3	High side driver output channel 3
15	LO3	Low side driver output channel 3
16	GND	Ground, short to pin 7

## 2.3 Ordering Information

Part Number	Package	Operation Temperature	Package Method	Marking
LKS513	ESOP16	-40 °C to 105 °C	Tape TBD Piece/Roll	LKS513 XXXXXXYX XXWWE



### 3 Physical Dimensions

ESOP16 Package:

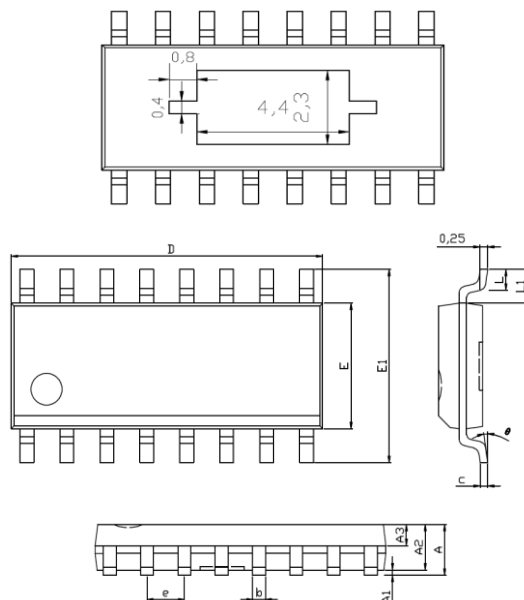


Figure 0-1 Packaging Graphic

Table 0-1 LKS513 Package size

Symbol	Dimensions In Millimeters	
	Min.	Max.
A		1.57
A1	0.00	0.07
A2	1.40	1.50
A3	0.61	0.71
b	0.39	0.45
c	0.51	0.26
D	9.70	10.10
E	3.70	4.10
E1	5.80	6.20
e	1.24	1.30
L	0.60	0.80
L1	0.99	1.10
$\theta$	0°	8°

## 4 Electrical Characteristics

### 4.1 Absolute Maximum Ratings

Table 4-1 Absolute Maximum Ratings

Symbol	Parameters	Min.	Max.	Unit
V <sub>CC</sub>	Power supply voltage	-0.3	40	V
V <sub>DD</sub>	LDO output voltage	-0.3	5.5	V
I <sub>VDD</sub>	LDO output current	-0.3	35	mA
V <sub>HIN</sub> V <sub>LIN</sub>	Input voltage	-0.3	20	V
V <sub>HO</sub>	High side output voltage	-0.3	V <sub>CC</sub>	V
V <sub>LO</sub>	Low side output voltage	-0.3	15	V
P <sub>DMAX</sub>	Package power dissipation	--	0.5	W
θ <sub>JA</sub>	Thermal resistance, junction to ambient	--	105	°C/W
T <sub>J</sub>	Junction temperature	-40	150	°C
T <sub>STG</sub>	Storage temperature	-55	150	°C
	ESD	2		KV

### 4.2 Recommended Operation Conditions

Table 4-2 Recommended Operation Conditions

Symbol	Parameters	Min.	Max.	Unit
V <sub>CC</sub>	Power supply voltage	8	28	V
V <sub>IN(ON)</sub>	Input ON Threshold Voltage	2.9	V <sub>CC</sub>	V
V <sub>IN(OFF)</sub>	Input OFF Threshold Voltage	0	0.4	V
T <sub>DEAD</sub>	MCU input dead time	0.5	--	us
F <sub>PWM</sub>	PWM Switching Frequency	--	50	kHz



### 4.3 Dynamic Electrical Characteristics

Unless otherwise specified,  $V_{CC}=24V$ ,  $C_L=1000\text{ pF}$ ,  $T_A=25^\circ\text{C}$ .

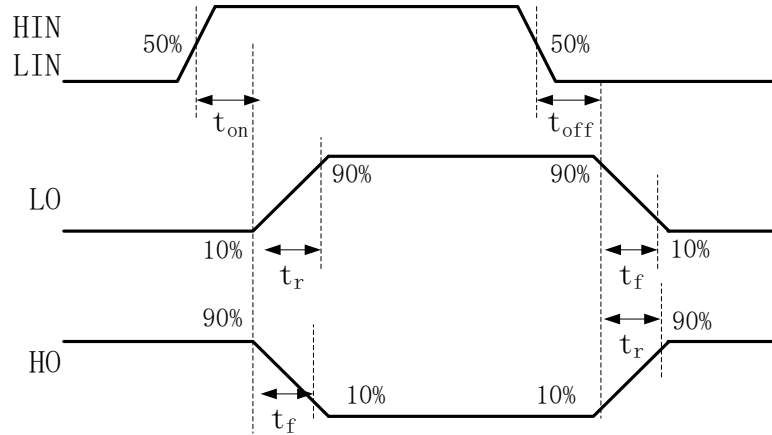


Figure4-1 Switching Timing Waveforms

Table4-3 Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
$T_{ON}$	Turn-on propagation delay		-	80	-	ns
$T_{OFF}$	Turn-off propagation delay		-	30	-	
$TH_R$	HO rise time		-	60	-	
$TH_F$	HO fall time		-	300	-	
$TL_R$	LO rise time		-	300	-	
$TH_F$	LO fall time		-	60	-	
DT	Dead time		-	100	-	

### 4.4 Static Electrical Characteristics

Table 4-4 Static Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
<b>Static Electrical Characteristics</b>						
$V_{CC\_ON}$	$V_{CC}$ under voltage rising threshold		5.8	6.5	7.4	V
$V_{CC\_UVLO}$	$V_{CC}$ under voltage falling threshold		5.4	6.0	6.8	V



$V_{CC\_HYS}$	$V_{CC}$ under voltage hysteresis voltage		0.3	0.5	0.8	V
$I_{QCC}$	Quiescent $V_{CC}$ supply current	HIN=LIN=0V	0.3	0.5	1.0	mA
$V_{DD}$	VDD output voltage		4.7	5	5.3	V
$V_{IH}$	Logic “1” input voltage		2.2	-	-	V
$V_{IL}$	Logic “0” input voltage		-	-	0.6	V
$I_{SOURCE}$	Logic “1” input bias current	HIN, LIN=5V	-	36	100	uA
$I_{SINK}$	Logic “0” input bias current	HIN, LIN=0V	-	0	1	uA
$V_{HO}$	HO output voltage	HIN=5V	VCC-1 1.5	VCC -10	VCC-8 .5	V
		VCC<10V	-	VCC	-	
$V_{LO}$	LO output voltage	LIN=5V	8.5	10	11.5	V
		VCC<10V	-	0	-	
$I_{HO+}$	HO source current	HO=VCC	-	50	-	mA
$I_{HO-}$	HO sink current	HO=VCC-8V	-	300	-	mA
$I_{LO+}$	LO source current	LO=0V	-	50	-	mA
$I_{LO-}$	LO sink current	LO=8V	-	300	-	mA
$T_{SD}$	TSD Temperature		-	150	-	°C
$T_{RECOVER}$	TSD release temperature		-	135	-	°C

## 5 Version History

Table 5-1 Document Version History

Time	Version number	Explain
2020.04.24	1.2	Minor Revision
2020.01.05	1.1	Minor Revision
2019.12.30	1.0	Revisions for releases

